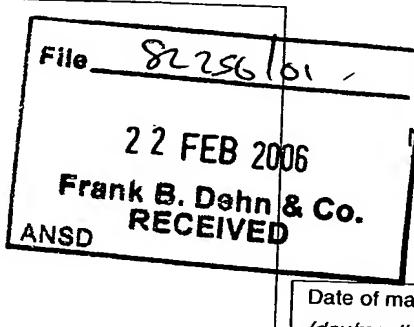


# PATENT COOPERATION TREATY

TIONAL PRELIMINARY EXAMINING AUTHORITY

To:

FRANK B. DEHN & CO.  
179 Queen Victoria Street  
London EC4V 4EL  
GRANDE BRETAGNE



PCT

NOTIFICATION OF TRANSMITTAL OF  
THE INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(PCT Rule 71.1)

Applicant's or agent's file reference 3.41.82256/001		Date of mailing (day/month/year) 20.02.2006
<b>IMPORTANT NOTIFICATION</b>		
International application No. PCT/EP2004/014738	International filing date (day/month/year) 27.12.2004	Priority date (day/month/year) 30.12.2003
Applicant BOREALIS TECHNOLOGY OY et al.		

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international preliminary examining authority:   European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer  Dekker, M Tel. +31 70 340-4046
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**PATENT COOPERATION TREATY**  
**PCT**  
**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**  
(Chapter II of the Patent Cooperation Treaty)  
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 3.41.82256/001	<b>FOR FURTHER ACTION</b>	
See Form PCT/IPEA/416		
International application No. PCT/EP2004/014738	International filing date ( <i>day/month/year</i> ) 27.12.2004	Priority date ( <i>day/month/year</i> ) 30.12.2003
International Patent Classification (IPC) or national classification and IPC C08F10/02, C08F2/06, C08F2/14		
<p><b>Applicant</b>  BOREALIS TECHNOLOGY OY et al.</p>		
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (<i>sent to the applicant and to the International Bureau</i>) a total of 2 sheets, as follows:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</li> <li><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</li> </ul> <p>b. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>		
<p>4. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Box No. I Basis of the opinion</li> <li><input type="checkbox"/> Box No. II Priority</li> <li><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li> <li><input type="checkbox"/> Box No. IV Lack of unity of invention</li> <li><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li><input type="checkbox"/> Box No. VI Certain documents cited</li> <li><input type="checkbox"/> Box No. VII Certain defects in the international application</li> <li><input type="checkbox"/> Box No. VIII Certain observations on the international application</li> </ul>		
Date of submission of the demand  31.10.2005	Date of completion of this report  20.02.2006	
Name and mailing address of the International preliminary examining authority:   European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer  Kaumann, E  Telephone No. +31 70 340-3640	



# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.  
PCT/EP2004/014738

## Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
  - This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
    - international search (under Rules 12.3 and 23.1(b))
    - publication of the international application (under Rule 12.4)
    - international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

### Description, Pages

1-19 as originally filed

### Claims, Numbers

13(part), 14, 15 as originally filed  
1-12, 13(part) received on 01.11.2005 with letter of 31.10.2005

### Drawings, Sheets

1/1 as originally filed

- a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

- The amendments have resulted in the cancellation of:
  - the description, pages
  - the claims, Nos.
  - the drawings, sheets/figs
  - the sequence listing (*specify*):
  - any table(s) related to sequence listing (*specify*):
- This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
  - the description, pages
  - the claims, Nos.
  - the drawings, sheets/figs
  - the sequence listing (*specify*):
  - any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/EP2004/014738

**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes:	Claims	1-15
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-15
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-15
	No:	Claims	

**2. Citations and explanations (Rule 70.7):**

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)**

200402199  
International application No.

PCT/EP2004/014738

14P200402199 30 JUN 2006

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Subject-matter**

Subject-matter the present application is a process for the (co-) polymerization of ethylene in a slurry or solution phase using a metallocene catalyst system. The diluent is recycled to the hydrogen feed stream. Since the diluent always contains traces of hydrogen, it is avoided that the catalyst comes into contact with the recycled diluent or with hydrogen.

**2. Problem and Solution**

The technical problem to be solved was to provide a process which avoids the partly deactivation of metallocene catalysts.

This problem is solved by avoiding contact of the catalyst or procatalyst with hydrogen containing recycled diluent or with hydrogen, since hydrogen partly deactivates the metallocene catalyst.

**3. Prior Art**

Reference is made to the following documents:

D1: WO 96/08520 (cited by the applicant)

D2: WO 00/34341

D3: EP 0 887 379

D4: US 2002/0065376

**D1** relates to a gas phase or slurry process for the polymerization of ethylene using a metallocene catalyst system. Page 10, line 16 - 25 discloses that the liquid polymerization medium (which may be a recycle stream) and the ethylene is added to the reactor together with hydrogen and the catalyst.

**D2** discloses the metallocene catalyst of the present application, which is used in a gas phase or slurry reactor for the polymerization of ethylene. The catalyst may be prepolymerized and the reaction medium may result from a previous reaction step. A gas phase step can follow. In one embodiment the feed of the first reactor can consist of the reaction mixture from a previous reactor, together with added fresh monomer, optional

**INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)**

International application No.

PCT/EP2004/014738

hydrogen and/or comonomer and cocatalyst.

**D3** discloses a process for the polymerization of propylene using a metallocene catalyst see col. 9, line 43 to col. 10, line 1). The process comprises a prepolymerization step, a slurry main polymerization step followed by a gas phase polymerization. In one embodiment (see col. 14, lines 6 - 21), a monomer containing stream is recycled back to the reactor. The stream may also contain hydrogen and catalyst.

**D4** discloses a slurry process for the polymerization and copolymerization of ethylene, comprising a prepolymerized metallocene catalyst and hydrogen as molecular weight regulator, which is added along with the catalyst (see [0100].

**4. Article 33(2) PCT (Novelty)**

The process according to **claims 1 - 15** appears to be novel.

**5. Article 33(3) PCT (Inventive Step)**

Contrary to the disclosures of the available prior art, the claimed process for the (co-) polymerization of ethylene in a slurry or solution phase, using a metallocene catalyst system, avoids that the catalyst comes into contact with the recycled diluent which may contain hydrogen, or directly with hydrogen.

The technical effect thereof is that a deactivation of the catalyst by hydrogen is avoided. The examples and comparative examples, whereon the shown technical effect is based, compare catalysts, which have not been precontacted with hydrogen to catalysts, which have been precontacted with hydrogen.

Hydrogen is normally used in polymerization reactions as molecular weight regulating agent. It appears that a negative effect of hydrogen on the catalyst activity was not considered in the art.

Therefore, it appears that the present inventors have described a surprising technical effect.

Therefore, an inventive step can be acknowledged.

**6. Article 33(4) PCT (Industrial Applicability)**

Since a high catalyst activity in solution and slurry process for the polymerization of ethylene is of very industrial interest, industrial applicability can be acknowledged.

**INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)**

International application No.

PCT/EP2004/014738